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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,821	09/05/2003	Michael Paul Tankard	K315.131.101	9414
25281	7590	12/14/2004	EXAMINER	
DICKE, BILLIG & CZAJA, P.L.L.C. FIFTH STREET TOWERS 100 SOUTH FIFTH STREET, SUITE 2250 MINNEAPOLIS, MN 55402			MCCLOUD, RENATA D	
			ART UNIT	PAPER NUMBER
			2837	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/656,821

Applicant(s)

TANKARD, MICHAEL PAUL

Examiner

Renata McCloud

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 09/05/03, 02/02/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Berroth et al (WO 02/054578), Berroth et al (US 6825627) being referred to and used as a translation in the rejection.

**Claim 1:** a circuit comprising a plurality of switches (Fig. 1: 114,132,130,136) connecting a phase winding (Fig. 1:102) to a supply (Fig. 1:121), the switches comprising a first set (114,136) and a second set (130, 132) for supplying current to the phase winding and returning current to the supply, the switches of the first and second set conducting current in both a first and a second direction and the first and second sets handling different peak currents (Fig. 3; Col. 5:40-46, the switches are capable of handling different peak currents, as the recitation "capable is broad so it does not require the reference to explicitly teach such, but only requires the ability to so perform).

**Claim 2:** the circuit is arranged during a motor mode (Fig. 3:before 222) to supply current to the phase windings via the first set and provide a path for returning

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current to the supply via the second set, and in a generator mode (Fig. 3: after 222) to supply current to the phase winding via the second set and return current to the supply via the first set (Fig. 3; Col. 5:40-46; Col. 6: 45-53).

**Claim 3:** the direction of the current in the phase winding in the motor mode (Fig.3: before 222) is opposite the direction in the generator mode (Fig. 3: after 222; Col. 6:45-53).

**Claim 4:** the switches are capable of operating as a diode (Fig.1: 114', 132', 130', 136').

**Claim 5:** a switch has an inherent integral reverse diode (Fig.1: 114', 132', 130', 136').

**Claim 6:** the switches are MOSFETS (Fig.1: 114,132,130,136).

**Claim 7:** the switches comprises enhancement layer MOSFETS (Fig. 1: 114, 132, 130, 136).

**Claim 8:** there are four switches (Fig. 1: 114,132,130,136) and the first set comprises two switches (Fig. 1: 114,136) rated higher than the remaining two forming a second set (Fig. 1:132,130).

**Claim 9:** the circuit comprises a first switch (114) connected between a first end of the winding and a first voltage rail, a second switch (132) connected between the first end of the winding and a second voltage rail, a third switch (130) between a second end of the winding and the first voltage rail, and a fourth switch (136) connected between the second end and the second rail the first (114) and fourth (136) switches forming a set.

**Claim 10:** the second (132) and third (130) switches form the second set.

**Claim 11:** each switch is a MOSFET (Fig. 1: 114,132,130,136).

**Claims 12, 14, and 15:** motor comprising a plurality of rotor poles, a stator having a plurality of stator poles (Fig. 1:108) and a circuit comprising a plurality of switches (Fig. 1: 114,132,130,136) connecting a phase winding (Fig. 1:102) to a supply (Fig. 1:121), the switches comprising a first set (114, 136) and a second set (130,132) for supplying current to the phase winding and returning current to the supply, the circuit is arranged during a motor mode (Fig. 3:before 222) to supply current to the phase windings via the first set and provide a path for returning current to the supply via the second set, and in a generator mode (Fig. 3:after 222) to supply current to the phase winding via the second set and return current to the supply via the first set and the first and second sets handling different currents (Col. 6:45-53).

**Claim 13:** the direction of the current in the phase winding in the motor mode (Fig. 3: before 222) is opposite the direction in the generator mode (Fig.3: after 222; Col. 6:45-53).

3. Claims 1-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Labriola (US 5977737).

**Claim 1:** a circuit comprising a plurality of switches (Fig. 1: Q1-Q4) connecting a phase winding (Fig. 1:140) to a supply (Fig. 1:V++), the switches comprising a first set (Q1, Q4) and a second set (Q2, Q3) for supplying current to the phase winding and returning current to the supply, the switches of the first and second set conducting current in both a first and a second direction and the first and second sets handling

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different peak currents (Col. 1:42-2:20, 11:66-12:5 the switches are capable of handling different peak currents, as the recitation "capable" is broad so it does not require the reference to explicitly teach such, but only requires the ability to so perform).

**Claim 2:** the circuit is arranged during a first mode to supply current to the phase windings via the first set and provide a path for returning current to the supply via the second set, and in a second mode to supply current to the phase winding via the second set and return current to the supply via the first set (Col. 11:28-12:8, antiphase mode is used for using the motor as a generator and recirculating mode is used for a motor).

**Claim 3:** the direction of the current in the phase winding in the first mode is opposite the direction in the second mode (Col. 11:28-12:8).

**Claim 4:** the switches are capable of operating as a diode (Fig. 1: Q1-Q4).

**Claim 5:** a switch has an inherent integral reverse diode (Fig. 1: 24,26,28,30)

**Claim 6:** the switches are MOSFETS (Fig. 1: Q1-Q4).

**Claim 7:** the switches comprises enhancement layer MOSFETS (Fig. 1: Q1-Q4).

**Claim 8:** there are four switches (Fig. 1: Q1-Q4) and the first set comprises two switches (Fig. 1: Q1, Q4) rated higher than the remaining two forming a second set (Fig. 1: Q2, Q3).

**Claim 9:** the circuit comprises a first switch (Q1) connected between a first end of the winding and a first voltage rail, a second switch (Q3) connected between the first end of the winding and a second voltage rail, a third switch (Q2) between a second end

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of the winding and the first voltage rail, and a fourth switch (Q4) connected between the second end and the second rail the first (Q1) and fourth (Q4) switches forming a set.

**Claim 10:** the second (Q3) and third (Q2) switches form the second set.

**Claim 11:** each switch is a MOSFET (Fig. 1: Q1-Q4).

**Claims 12, 14, and 15:** motor comprising a plurality of rotor poles, a stator having a plurality of stator poles (Fig. 2:40) and a circuit comprising a plurality of switches (Fig. 1: Q1-Q4) connecting a phase winding (Fig. 1:14) to a supply (Fig. 1:V++), the switches comprising a first set (Q1, Q4,) and a second set (Q2, Q3) for supplying current to the phase winding and returning current to the supply, the circuit is arranged during a first mode to supply current to the phase windings via the first set and provide a path for returning current to the supply via the second set, and in a second mode to supply current to the phase winding via the second set and return current to the supply via the first set and the first and second sets capable of handling different currents (Col. 11:28-12:8, antiphase mode is used for using the motor as a generator and recirculating mode is used for a motor; capable is broad so it does not require the reference to explicitly teach such, but only requires the ability to so perform).

**Claim 13:** the direction of the current in the phase winding in the first mode is opposite the direction in the second mode (Col. 11:28-12:8).

4. Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Ferreira (US 6028760).

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**Claim 1:** a circuit comprising a plurality of switches (Fig. 1: Q1-Q4) connecting a phase winding (Fig. 1:14) to a supply (Fig. 1:Vs), the switches comprising a first set (Q1, Q3) and a second set (Q2, Q4) for supplying current to the phase winding and returning current to the supply, the switches of the first and second set conducting current in both a first and a second direction and the first and second sets handling different peak currents (Fig. 3, Fig. 4 the switches are capable of handling different peak currents, as the recitation "capable" is broad so it does not require the reference to explicitly teach such, but only requires the ability to so perform).

**Claim 2:** the circuit is arranged during a first mode to supply current to the phase windings via the first set and provide a path for returning current to the supply via the second set (Col. 5:49-6:22), and in a second mode to supply current to the phase winding via the second set and return current to the supply via the first set (Col. 10: 27-46).

**Claim 3:** the direction of the current in the phase winding in the first mode is opposite the direction in the second mode (Col. 10:27-46).

**Claim 4:** the switches are capable of operating as a diode (Fig. 1: Q1-Q4, Col. 5:49-55).

**Claim 5:** a switch has an inherent integral reverse diode (Fig.1: Q1-Q4)

**Claim 6:** the switches are MOSFETS (Col. 5:49-55).

**Claim 7:** the switches comprises enhancement layer MOSFETS (Col. 5:49-55).



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**Claim 8:** there are four switches (Fig. 1: Q1-Q4) and the first set comprises two switches (Fig. 6: Q2, Q4) rated higher than the remaining two forming a second set (Fig. 6: Q1 Q3).

**Claim 9:** the circuit comprises a first switch (Q1) connected between a first end of the winding and a first voltage rail, a second switch (Q2) connected between the first end of the winding and a second voltage rail, a third switch (Q4) between a second end of the winding and the first voltage rail, and a fourth switch (Q3) connected between the second end and the second rail the first (Q1) and fourth (Q3) switches forming a set.

**Claim 10:** the second (Q2) and third (Q4) switches form the second set.

**Claim 11:** each switch is a MOSFET (Col. 5:49-55).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferreira (US 6028760).

**Claims 12, 14, and 15:** Ferreira teaches a switches reluctance drive (Col. 1:49-56) and a circuit comprising a plurality of switches (Fig. 1: Q1-Q4) connecting a phase

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winding (Fig. 1:14) to a supply (Fig. 1:Vs), the switches comprising a first set (Q1, Q3, or Q2, Q4) and a second set (Q2, Q4, Or Q1, Q3) for supplying current to the phase winding and returning current to the supply, the circuit is arranged during a first mode to supply current to the phase windings via the first set and provide a path for returning current to the supply via the second set (Col. 5:49-6:22), and in a second mode to supply current to the phase winding via the second set and return current to the supply via the first set (Col. 10: 27-46) and the first and second sets capable of handling different currents (Fig. 3, Fig. 4, "capable" is broad so it does not require the reference to explicitly teach such, but only requires the ability to so perform).

Ferreira does not teach a rotor having a plurality of rotor poles, a stator having a plurality of stator poles. Ferreira discloses that it is known in the art to provide a power converter in a switch reluctance motor (Col. 1:49-56) and it is known in the art that a switched reluctance motor comprises a plurality of rotor poles, a stator having a plurality of stator poles. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the invention of Ferreira in a switched reluctance motor having a plurality of rotor poles, a stator having a plurality of stator poles. The advantage of this would be the ability to energize the motor with bipolar currents.

**Claim 13:** the direction of the current in the phase winding in the first mode is opposite the direction in the second mode (Col. 10:27-46).

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**Conclusion**

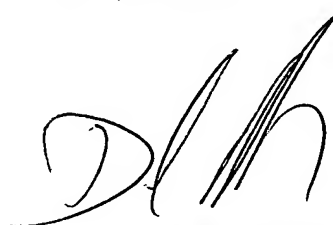
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renata McCloud whose telephone number is (571) 272-2069. The examiner can normally be reached on Mon.- Fri. from 8 am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on (571) 272-2800 ext. 4. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RDM

Renata McCloud  
Examiner  
Art Unit 2837

A handwritten signature in black ink, appearing to be 'DM' with a stylized flourish.

DAVID MARTIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800